

CHE Response to the 2016 Report of the Committee of Visitors

June 29, 2016

The Division of Chemistry (CHE) thanks the members of the 2016 Committee of Visitors (COV) for their time and effort on their review of the processes of the Division. We are very grateful to Dr. Sharon Hammes-Schiffer for chairing the COV, especially her leadership in providing a timely and thorough report.

We appreciate the detailed and addressable report. The Division has worked hard to be fair in the review process, and provides each proposal with significant attention and much thought. We are pleased that the significant efforts by the technical and administrative staff have been acknowledged by the COV.

The COV made three main recommendations that we address below:

“Recommendation #1: Advocate additional funding for the Chemistry Division overall and maintain focus of existing funds on high-impact fundamental research. The percentages of funded proposals are low, and many strong proposals cannot be funded. Although the COV recognizes the challenges in the current funding climate, additional funds would greatly enhance the ability of the Division to maintain a strong research portfolio. The COV commends the Division for allocating a substantial portion of the budget to fundamental research and advises against diversion of existing funds from the core mission of fundamental research in efforts to initiate new programs. The highest priority should be funding the best fundamental science and transformative chemistry. In addition, the Division should ensure that the grant sizes are large enough to enable transformative chemistry with broad societal impact and should advocate for additional funds to increase both the number and the size of the grants.”

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The Division agrees. There are far too many significant proposals that must be declined due to limited funding, and, indeed, the portfolio would be greatly enhanced with additional funding. The Division of Chemistry plays a very active role in NSF strategic planning, suggesting and developing initiatives with other divisions within the Mathematics and Physical Sciences Directorate (MPS). We have, and will continue to be active in contributing towards NSF-wide planning, identifying areas where the chemistry community could play a critical role should opportunities for new funding become available.

In the past year, the Division has worked with MPS and other Directorates throughout the Foundation to participate in the Innovations at the Nexus of Food, Energy and Water Systems (INFEWS) initiative. The Division has coordinated several workshops within the community to listen to the community’s feedback on specific areas of chemistry involvement. We have also worked with strategic partners such as the Division for Chemical, Bioengineering, Environment and Transport Systems (CBET) to put together Dear Colleague Letters (DCLs) such as one that targets the conversion of nitrogen to ammonia, the selective recovery of phosphorous from agricultural environments and the remediation of water systems. These effort plays to the Division’s strengths in catalysis, supramolecular assemblies, sensing and analytical methods.

The Division has also actively engaged in activities such as the Brain Initiative as this is a signature initiative of the President’s Administration. In the next few months, we will be sponsoring a workshop on activities associated with identifying chemistry challenges that would lead to new fundamental tools for measuring brain organization and operation as well as new knowledge on how the brain functions. This workshop will bring chemists together with neuroscientists and computer scientists internationally. The effort plays to the Division’s strengths in studying the chemistry of life processes, synthesis, and, again, sensing and tool development.

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The Division of Chemistry seeks a very thoughtful balance between participating in new initiatives (which may or may not bring new funding to the Division) and actively supporting the research ideas proposed as part of our community's current research interests. CHE prioritizes the core mission of fundamental research. We will continue to issue or participate new solicitations and Dear Colleague Letters when such activities support our core strengths. Examples of such efforts include Sustainable Chemistry, Engineering and Materials (SusChEM) that focuses on sustainable and green chemistry practices. Such efforts are well supported by the academic and industrial communities, and are highly encouraged by younger generations of scientist who are increasingly aware of the challenges associated with coupling innovation and environmental responsibility.

To try to maximize the support to the chemistry community, we will continue to actively pursue co-funding opportunities, with external agencies, as well as with other NSF divisions and directorates. For example, the Division co-funds awards with the Department of Energy and NASA, with the Directorates for Computer & Information Science & Engineering (CISE) and Engineering (ENG), as well as with divisions within the Directorate of Mathematical and Physical Sciences, to name a few.

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We agree that increasing both the number and size of our grants is indeed desirable. The average grant size in CHE has not changed much in a number of years, even though changes have occurred in the academic and industrial communities that have impacted how far our award funding can be stretched (e.g., fees for waste disposal, increasing costs of solvents and other supplies, and required minimum funding for postdoctoral-level employees). The Division will hold our annual retreat in September 2016, and one of the topics for our discussion will be to consider the balance between increased award size and the number of awards.

“Recommendation #2: Enhance transparency of the reviewing and decision processes. To maintain the trust and support of the chemistry community, the reviewing and decision processes must be transparent. Although the individual reviews and panel summaries are sent to the principal investigator (PI), the basis for the final decision is not always clear. The Program Officers write detailed summaries that synthesize the reviews and panel discussions and explain the basis for the final decision in the Review Analysis. However, the Program Officer Comments section sent to the PI is often very brief and less informative. Although the PI is encouraged to talk to the Program Officer by phone, these comments would be more useful if conveyed in writing. Thus, the COV recommends that the Program Officer Comments section contain more information about the decisions for declining proposals, including the allowable comments from the Review Analysis, consistently across the programs. The consistent and effective use of panels across the programs, supplemented by ad hoc reviews as needed to add specific reviewer expertise, is also recommended to ensure greater transparency of the reviewing process. In addition, the COV recommends that the Division better clarify the assessment, weighting, and accountability of the broader impacts to the PIs and reviewers.”

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The Chemistry Division agrees that it is important to provide our proposers with critical feedback regarding their award and declination recommendations. CHE program officers spend substantial effort preparing their Review Analysis. We thank the COV for noting the usefulness of these analyses. At our upcoming retreat, the Division will discuss how to offer more feedback to the communities that we serve.

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Over the last decade, the Division of Chemistry has migrated from relying almost solely on ad hoc proposal review to relying mainly on panel review (>90%). We have also migrated from on-site panels to a majority of virtual panels (~70-80%).

The combination of reviews and panel summaries enables critical advice and helpful insights to be shared with the principle investigators as a result of the review process. The use of panel review also enables a greater participation in the reviewing process, providing opportunities for the community to engage and learn more about how to prepare effective proposals and providing opportunities for members of the community to interact with one another and with NSF staff. For the Division, panels provide benefits in terms of expediting proposal processing, with a greater return of timely reviews. Panels also provide Program Officers with some guidance in terms of proposal ranking as viewed by the external chemistry community.

This said, it is important to recognize that panel review does have potential downsides. It does take time and effort to set up, coordinate, and hold panels and thus there is a significant administrative overhead and cost associated with the use of panels. Additionally, it is sometimes difficult to recruit expert panelists due to conflicts of interest and/or the unwillingness on the part of potential reviewers to commit to a significant numbers of reviews (often 6-10 reviews are requested from each panelist versus one review per ad hoc reviewer). Most importantly, panel review does not often provide the depth of focus that ad hoc reviews can supply as panels are often convened to cover a broader scope of research projects

While most of CHE's programs review proposals using panels, it is important that Program Officers have the option to conduct ad hoc review, when necessary, in order to provide the most comprehensive review of proposals. The Division will consider this balance each year, noting the encouragement towards panels, while considering reviewer and staff time and effort, administrative costs, and most importantly, the value of the feedback obtained in the review process.

“ . . . the COV recommends that the Division better clarify the assessment, weighting, and accountability of the broader impacts to the PIs and reviewers.”

CHE understands that the assessment, weighting and accountability of the broader impacts criterion is a topic that continues to challenge PIs and reviewers alike. NSF has worked hard to provide better perspectives on Broader Impacts including publishing a recent report: “Perspectives on Broader Impacts,” (NSF 15-008; https://www.nsf.gov/od/oia/publications/Broader_Impacts.pdf), that was discussed at a recent MPS Advisory Committee Meeting.

In the next year, the Division will reassess our activities regarding assessment, weighting, and accountability with regard to broader impacts with a goal of providing additional clarity to the chemistry community, especially with regard to charging panelists/reviewers and giving feedback to principal investigators on their annual reports. We will also continue to look for opportunities to participate in NSF-wide engagement opportunities with regard to broadening participation.

“Recommendation #3: Broaden the representation of proposals across types of institutions and principal investigators. Inclusiveness at all levels is essential to the mission of the NSF. A wide range of perspectives and narratives provides the substance required to tackle global issues and to exert a significant impact. The COV encourages the Division to continue successful programs and create effective new approaches to increase the number of high-quality proposals submitted from different types of primarily undergraduate institutions (PUIs) and PhD granting institutions. The heterogeneity of institutions within the PUI and PhD communities is significant, and this heterogeneity should be recognized in the creation of solicitations and in the review processes that lead to the funding or declination of proposals. Moreover, the same attention should be given to increasing the number of proposals from underrepresented minorities (URMs) and women, while maintaining the expectation of approximately equivalent success rates across the various groups. Current approaches aimed at

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The Division of Chemistry certainly strives to encourage proposals from a broad variety of institutions. Recently, the Division has expanded its activities at the American Chemical Society (ACS) National Meetings to ACS Regional Meetings, to try to reach faculty from a broader variety of institutions. As an example, this year we presented at the Mid-Atlantic Regional Meeting (MARM) as well as at the National Organization of Black Chemists and Chemical Engineers (NOBCChE) National Meeting. We look forward to presenting a special Presidential Symposium at the ACS National Meeting in Philadelphia in August 2016, entitled “NSF Opportunities”. This symposium will have a dedicated session focused on opportunities for primarily undergraduate institutions. We continue to look for creative ways to interaction with the community and will continue our outreach efforts as budgets permit.

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The Division of Chemistry does indeed recognize these differences in review processes, engaging reviewers with expertise from a broad variety of institutions. This is a charge that CHE takes very seriously and so we will discuss this issue in more detail in our upcoming retreat.

“ . . . Current approaches aimed at increasing the numbers of applications from URMs and women have not been fully successful, indicating that other mechanisms need to be created and launched.”

We agree that engaging underrepresented minorities and women is important. There are initiatives underway both within the Division of Chemistry and at NSF that have yet to be assessed. The Division of Chemistry sponsored its first Chemistry Early Career Workshop in March 2016, involving new and perspective faculty members, postdocs and graduate students from a broad variety of institutions. The representation at the Workshop was very diverse, with 57 of the 100 participants self-identifying as a member of an underrepresented group (woman or other minority). The workshop actively involved the Division of Chemistry staff. Both Program Directors and Administrative Staff provided the early career participants with numerous opportunities for one-on-one discussion. Mock panels were convened to illustrate the NSF review criteria and various types of proposal mechanisms as well as demonstrate how to craft a successful proposal. While it is too early to gauge the success of this workshop in terms of proposal submissions and awards, from the discussions with participants, the Division believes that this activity is an important endeavor, and plans to continue this as a mechanism to encourage applications from URMs and women, as well as to engage with new faculty. NSF has issued supplemental funding opportunities for Historically Black Colleges and Universities (HBCU) and for Career-Life Balance, to encourage broader participation of URMs and women. The HBCU call occurred in 2016, so the impact of this call is not yet known.

The Division will continue to assess the mechanisms in place and consider new potential avenues for encouraging broadening participation.